

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference XSI89/10X254	FOR FURTHER ACTION		See Form PCT/IPEA/416
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International Patent Classification (IPC) or national classification and IPC IPC(7): G05B 11/01; G01C 21/00; H04L 7/00 and US Cl.: 700/19; 701/213; 375/354			
Applicant FREESCALE SEMICONDUCTOR, INC.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>5</u> sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 28 April 2005 (28.04.2005)		Date of completion of this report 27 June 2005 (27.06.2005)	
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Zoila Cabrera Telephone No. 571-272-3738	

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/17438

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1-10,12-14,16-25,27 and 28 as originally filed/furnished

pages* 11,15 and 26 received by this Authority on 28 April 2005 (28.04.2005)

pages* NONE received by this Authority on _____

☒ the claims:

pages 29,31,32 and 34-38 as originally filed/furnished

pages* NONE as amended (together with any statement) under Article 19

pages* 30 and 33 received by this Authority on 28 April 2005 (28.04.2005)

pages* NONE received by this Authority on _____

☒ the drawings:

pages 1 and 2 as originally filed/furnished

pages* NONE received by this Authority on _____

pages* NONE received by this Authority on _____

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

International application No.
PCT/US04/17438

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims 3, 4, 8, 12-13, 17, 22-24 YES

Claims 1-2, 5-7, 9-11, 14-16, 18-21 NO

Inventive Step (IS)

Claims 22-24 YES

Claims 1-21 NO

Industrial Applicability (IA)

Claims 1-24 YES

Claims NONE NO

2. Citations and Explanations (Rule 70.7)

Please See Continuation Sheet

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

V. 2. Citations and Explanations:

Claims 1-2, 5-7, 9, 10-11, 14-16, 18-21 lack novelty under PCT Article 33(2) as being anticipated by Tan et al. (US 2002/0193945 A1).

Regarding claims 1-2, 5-7, 9, 10-11, 14-16, 18-21, Tan discloses a plurality of mobile communication devices or wireless communication systems and a host (Page 1, [0002], [0018]) wherein a device wishing to transmit uses a time slot in each TDMA time-frame used for transmission. Tan further discloses means for synchronization to the TDMA time frame using a synchronization signal, the synchronization signal being transmitted by said communication device or a GPS satellite (Page 1, [0004]; [0008], please note that the time slot in each TDM time-frame corresponds to the first free-running timer value and the second free-running timer value corresponds to the time signal from a global positioning satellite (GPS)). Tan discloses that a transceiver is connected to a burst mode controller which collects continuous outbound data and buffers this for a period equivalent to a TDM time-frame and then send the buffered data in packet as a burst at a designated time slot in the TDM time-frame (Page 1, [0018]). Tan discloses that the data packet structure includes a preamble and sync word used to synchronize the transmission timing between two or more signals and A-Field which is used to carry control and all other types of information such as identity number of the transmitting party (Page 2, [0019], [0023]). Tan discloses the synchronization using a Beacon Transmission (Page 3, [0048], please note that in order to synchronize an offset timing value has to be adjusted).

Claims 3-4, 12-13 lack an inventive step under PCT Article 33(3) as being obvious over Tan et al. (US 2002/0193945 A1) in view of Choi et al. (US 6,272,117).

Tan discloses the limitations of claims 1, 10 and 19 above but fail to disclose the limitations of claims 3-4 and 12-13. However, Choi discloses a wireless data network including a base station and multiple wireless terminals (Abstract) wherein data packets include two or more levels of encapsulation (Fig. 7C, elements 702, 703, 701). Choi further discloses first and second time stamp markers, the first stamp marker being in a first of the two or more levels of encapsulation, and the second time stamp marker being in a second of the two or more levels of encapsulation (Figs. 7a, 7b, Control packet time, guard time, data packet time; Col. 7, lines 27-63).

Claims 8 and 17 lack an inventive step under PCT Article 33(3) as being obvious over Tan as applied to claims 1 and 10 above and further in view of Fullerton et al (US 2003/0043931 A1).

Regarding claims 8 and 17, Tan discloses the limitations of claims 8 and 17 above but fails to disclose an ultrawide bandwidth transceiver. However, Fullerton discloses an ultrawide-band communication system and method. Therefore, it would have been obvious to a person of the ordinary skill in the art at the time the invention was made to combine the teachings Tan with the

Supplemental Box

method of Fullerto because it would provide with an improved system wherein an impulse radio link can communicate many independent channels simultaneously by employing different subcarriers for each channel (Abstract, lines 1-11).

Claims 22-24 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the step of: Regarding independent claim 22, a second time stamp processor for receiving the second time stamp and generating a host data process signal based on the second time stamp, the correction value and a latency value, the latency value indicating an expected maximum latency time for the air link frame over the wireless channel, in combination with the other elements and features of the claimed invention.

RESPONSE TO ARGUMENTS:

Applicant's arguments of April 28, 2005 with respect to claims 1-21 have been considered but they are not persuasive. The claims are written are so broad as to read in Tan. Applicant contends that Tan does not disclose any identifier of time relative to a global synchronizing event. Applicant further contends that Tan does not disclose a first time stamp marker and a second stamp marker corresponding to a global synchronizing event. Applicant contends that Tan does not disclose an offset timing value with respect to the global synchronizing event. Lastly, Applicant contends that Tan does not disclose a first free running-timing value and a global synchronizing event and a second free-running time value. Examiner disagrees because Tan discloses such features. Tan discloses a plurality of mobile communications apparatus arranged for peer-to-peer communication. Tan discloses that said device uses a time slot in each TDMA time-frame, the time slot in each frame being the same and wherein the communication devices include means for synchronization to the same TDMA time frame using said communication device or a GPS satellite ([0004]). Therefore the global synchronizing event corresponds to the GPS signal. Tan clearly discloses that all devices are synchronized to each other using a common time base to perform the synchronization wherein the synchronization is performed by using the time signal from a global position satellite (GPS) [0008]. Please note that each mobile device would include a time stamp that corresponds to the time included in each TDMA time-frame. The second stamp maker would correspond to the time signal provided by the GPS and used to synchronize the plurality of mobile devices. Regarding the offset timing value, it is inherent that an offset timing is included in a synchronization otherwise it would not be synchronized.

The host interface header 310 includes information necessary to identify the packet. It should have sufficient information to extract and order the host data frames or frame portions in the payload 330. In exemplary embodiments, the host interface header 310 may include the length of the packet, a protocol identifier, or any other
5 information necessary to process the packet 300.

The host interface time stamp 320 includes time stamp information for the current host interface frame 300. In the first exemplary embodiment this time stamp information includes a periodic signal identifier and an offset time. Preferably the time stamp information indicates when the host instructs the transmitter device 100 to
10 send a host data packet, not necessarily when the transmitter device 100 grabs the host data packet. (These two times may differ in some embodiments.) However, alternate embodiments may use any predictable time desired for setting the time stamp information, so long as it is consistent between the devices in a network. In other words, the host interface time stamp 320 can be linked to any particular moment, so
15 long as it the receiving device can use that time as a proper indicator for release of a host interface packet 300.

In this embodiment the host interface time stamp 32 can be a 16-bit periodic signal identifier combined with a 16-bit offset value, accurate to within 0.1 μ sec, although 1 μ sec accuracy may be adequate in some embodiments, although some
20 embodiments could require finer resolution.

The periodic signal identifier is an indicator for the most recently received periodic signal. In the first exemplary embodiment this is a beacon identifier for the beacon most recently received by the transmitter device 100 (or transmitted by the

When the host interface circuit 210 receives the next host interface packet 300, it then extracts the host data packet and sends it onward to the host (not shown) in the receiver 200 for processing.

5 In this embodiment it is necessary for the receiver device 200 to understand that because the offset value is repeatedly reset to zero, the periodic signal identifier must be used in conjunction with the offset value to determine when a host interface packet 300 should be released. In other words, it might be necessary to release a packet 300 with a high offset value but a low periodic signal identifier before releasing a packet with a lower offset value but a higher periodic signal identifier.

10 Although the information passed from the host to the transmitter host interface circuit 110 is described as being a host interface packet and the information transmitted by the wireless transceiver 130 is described as being an air link frame, the terms "frame" and "packet" can be used interchangeably in each case, and should not be interpreted in any way as limiting the scope of the attached claims. However, for

15 the sake of clarity in this disclosure, the term "packet" will be used to describe the signals sent from the host interface 110 and the term "frame" will be used to describe the signals transmitted by the wireless transceiver 130.

Second Exemplary Embodiment

In a second exemplary embodiment a time stamp is provided with each host

20 interface packet sent from a host interface, and with each air link frame sent from a wireless transceiver. The time stamp for each host interface packet includes a time value taken from a free-running clock at the transmitting device. The time stamp for

Frequency Locking

In addition to continually synchronizing the timing for a plurality of receiver devices 200, 600, the use of time stamps synchronized to a global synchronization event also allows for the receiver devices 200, 600 to perform frequency locking.

5 As each receiver device 200, 600 synchronizes its local timing based on the relevant time stamp, that timing will be either correct, too slow, or too fast in comparison with a time derived from the global synchronizing event. At this time, in addition to correcting the actual timing value, the receiver device 200, 600 could also correct the timer frequency in an effort to reduce the need to make changes in the
10 future.

If the timing value in the receiver device 200, 600 is too high, the device 200, 600 can reduce its frequency slightly to lower the speed at which its timing value rises. Similarly, if the timing value in the receiver device 200, 600 is too low, the device 200, 600 can increase its frequency slightly to raise the speed at which its
15 timing value rises. If the receiver device 200, 600 performs this function repeatedly as it synchronizes or adjusts its timing signal, the frequency of the receiver device 200, 600 will begin to approach that of the frequency of the global synchronizing event, reducing the need for future timing adjustments.

In various embodiments the frequency adjustment function can be performed
20 at different times. For example, it could be performed as each host interface packet is processed, or periodically as host packets are processed, at some fixed or adjustable rate.

4. A method of time stamping data in a local wireless device, as recited in claim 3, wherein the time stamp information includes first and second time stamp markers, the first time stamp marker being in a first of the two or more levels of encapsulation, and the second time stamp marker being in a second of the two or more
5 levels of encapsulation.

5. A method of time stamping data in a local wireless device, as recited in claim 4,
wherein the first time stamp marker comprises a first free-running timer value
10 corresponding to the host data, and
wherein the second time stamp marker comprises a global synchronizing event identifier and a second free-running timer value corresponding to the global synchronizing event.

15 6. A method of time stamping data in a local wireless device, as recited in claim 1, wherein the time stamp information comprises a global synchronizing event identifier and an offset timing value relating the host data in time with respect to the global synchronizing event.

20 7. A method of time stamping data in a local wireless device, as recited in claim 1, wherein the method is embodied in an integrated circuit.

8. A method of time stamping data in a local wireless device, as recited in claim 1, wherein the method is embodied in an ultrawide bandwidth transceiver.

13. A method of coordinating data in a wireless receiver, as recited in claim
12, wherein the time stamp information includes first and second time stamp markers,
the first time stamp marker being in a first of the two or more levels of encapsulation,
and the second time stamp marker being in a second of the two or more levels of
5 encapsulation.

14. A method of coordinating data in a wireless receiver, as recited in claim
13,
wherein the first time stamp marker comprises a first free-running timer value
10 corresponding to the host data, and
wherein the second time stamp marker comprises a global synchronizing event
identifier and a second free-running timer value corresponding to the global
synchronizing event.

15. A method of coordinating data in a wireless receiver, as recited in claim
10, wherein the time stamp information comprises a global synchronizing event
identifier and an offset timing value relating the host data in time with respect to the
global synchronizing event.

20. 16. A method of coordinating data in a wireless receiver, as recited in claim
10, wherein the method is embodied in an integrated circuit.

17. A method of coordinating data in a wireless receiver, as recited in claim
10, wherein the method is embodied in an ultrawide bandwidth transceiver.

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